

Laparoscopic distal gastrectomy with intracorporeally hand - sewn anastomosis for gastric cancer

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Abstract

Introduction: Laparoscopic distal gastrectomy with D2 lymph nodes dissection has become an ideal option for early gastric cancer, especially totally laparoscopic distal gastrectomy using intracorporeally hand–sewn anastomosis has many advantages. This study was performed to evaluate the safety and feasibility of this method in laparoscopic distal gastrectomy with lymph node dissection.

Patients and methods: Prospective study with 6 gastric cancer patients was performed totally laparoscopic distal gastrectomy with D2 lymph nodes dissection using intracorporeally hand-sewn anastomosis at Gastrointestinal Surgery Department – Viet Duc University Hospital from 5/2021 to 5/2022.

Results: 6 patients were performed totally laparoscopic distal gastrectomy with D2 lymph nodes dissection. One patient with cancer was in situ (Tis), one patient with tumor invaded the mucosa layer (T1a), two patients with tumor invaded the submucosal layer (T1b), one patient with tumor invaded the muscle layer (T2), one patient with tumor invaded the serosa (T3). The mean number of harvested lymph nodes was $18,3 \pm 7$ (11-25). There was no open conversion. The mean operating time was 220.7 ± 45.3 min (180-266). The average length of post-operative stay was $7,3 \pm 0,7$ days (7-8 days). one case had a postoperative low-grade fever and one case had fever associated with slight inflammation around the drainage site.

Conclusions: Totally laparoscopic distal gastrectomy with D2 lymph nodes dissection with intracorporeally hand–sewn Billroth II anastomosis appears to be a safe and efficient procedure. Patients recovered faster with less pain as well as aesthetically and economically high efficiency.

Keywords: Totally laparoscopic distal gastrectomy, hand-sewn gastrointestinal anastomosis, early gastric cancer.

Introduction

Laparoscopic surgery for gastric cancer was first reported in 1994 by Kitano with distal subtotal gastrectomy with Billroth I anastomosis associated with D1 lymph node dissection [1]. This surgery has been applied and developed in the last 2 centuries. The advantages of this surgery comparing to open surgery have been proven such as small incision, aesthetic, the ability to manipulate more easily in the abdomen by the large and magnified surgical field, minimize touching the tumor, patient recovered well postoperation and improved life quality [2], [3]. The laparoscopic lymph nodes dissection technique is gradually developing to match the quality like open surgery. Small laparoscopic distal gastrectomy technique with extracorporeal anastomosis has been applied routinely in the world as well as in Vietnam. However, small incisions still have infection risk and herniation of the abdominal wall postoperation, thus, the patient needs to use lots of painkillers. On the other hand, gastrectomy with small incision encounters many challenges, especially with tumor located at the lesser curvature, in which the spleen is easily damaged and difficult to acquire a standard resection surface.

Totally Laparoscopic Distal Gastrectomy (TLDG), D2 lymph node dissection with intracorporeally hand-sewn anastomosis has advantages over the outside region due to larger surgical space, less invasive, patient does not have a long incision on abdomen which helps avoid complications of the incision. Gastrointestinal anastomosis has 2 techniques: hand-sewing and linear or circular stapler. Hand-sewing through laparoscopic is more complex which requires the surgeon skill to be proficient and has enough experience but it helps to reduce surgical fees for patient. This article was conducted to evaluate early results, the feasibility and some advantages of hand-sewn anastomosis technique in TLDG, lymph nodes dissection.

Patient and methods

Patients

From 05/2021 – 05/2022, 6 gastric cancer patients were performed TLDG, D2 lymph nodes with intracorporeally hand-sewn anastomosis at Gastrointestinal Surgery Department, Viet Duc University Hospital. All patients were diagnosed with gastric carcinoma in the antrum of a pyloric region or the transverse lesser curvature,

Selection criteria for patients with gastric cancer based on clinical and subclinical indications for TLDG include: Tumor was diagnosed, confirmed through esophagogastroduodenoscopy with biopsy, located from the transverse lesser curvature stomach to pylorus. CT scan evaluates the stomach wall tumor without infiltrating and invading adjacent organs. The patient had no complications such as pyloric stenosis, perforation or severe bleeding, or liver and kidney dysfunction; There were no distant metastases on CT scan or MRI. Past surgical history can be considered on a single-patient basis.

Exclusion criteria include: (1) Laparoscopy of the stomach without radical; (2) Distant metastasis; (3) Tumor invades adjacent organs; (4) The tumor has not been determined the malignancy on histopathological examination or not; (5) Patients with severe health conditions that make anesthesia unacceptable such as myocardial infarction, severe heart failure, severe pneumonia; (6) pregnant women; (7) The old surgical history does not allow laparoscopic surgery.

Research methods

The study describes clinical cases of TLDG, performed at the Gastrointestinal Surgery Department – Viet Duc University Hospital. All patients were operated on following one default procedure.

Surgical procedures: After being anesthetized, the patient was in the supine position, legs spread to the sides, with 5 Trocars being used. The surgeon stands in the middle, assesses the lesion and begins to remove the entire greater omentum from the left transverse colon, exposing and ligating the left gastric

omentum. Continue to remove the great omentum to the right from the transverse colon, expose and close the base of the right gastric omental artery bundle after dissection of the N6 node, clearly visualize the duodenum and head of the pancreas. After extensive resection of the lesser omentum, the gastroduodenal artery was exposed and the right gastric branch was ligated close to the root, accompanied by dissection of the N5, N12a, and 12P nodes. Double duodenum with 60mm laparoscopic cutter. Continue dissection along the superior border of the pancreas and the common hepatic artery, dissecting the N7, 8a, 9 and

11p nodes. Expose and ligation of the left gastric artery close to the base. Dissect along the lesser curvature of the stomach to dredge the N1, N3 nodes to the abdominal esophagus.

Marked the section to ensure the oncology of the anterior gastric surface. In gastrectomy, one part is cut with a scalpel, the other part is cut with a 60mm Stapler. Perform gastro-intestinal anastomosis in Billroth II, suture anterior transverse colon equal to V-loc dissolvable stitches. Place a small drain under the liver through the trocar hole. Enlarge the umbilical trocar hole for removing specimen.

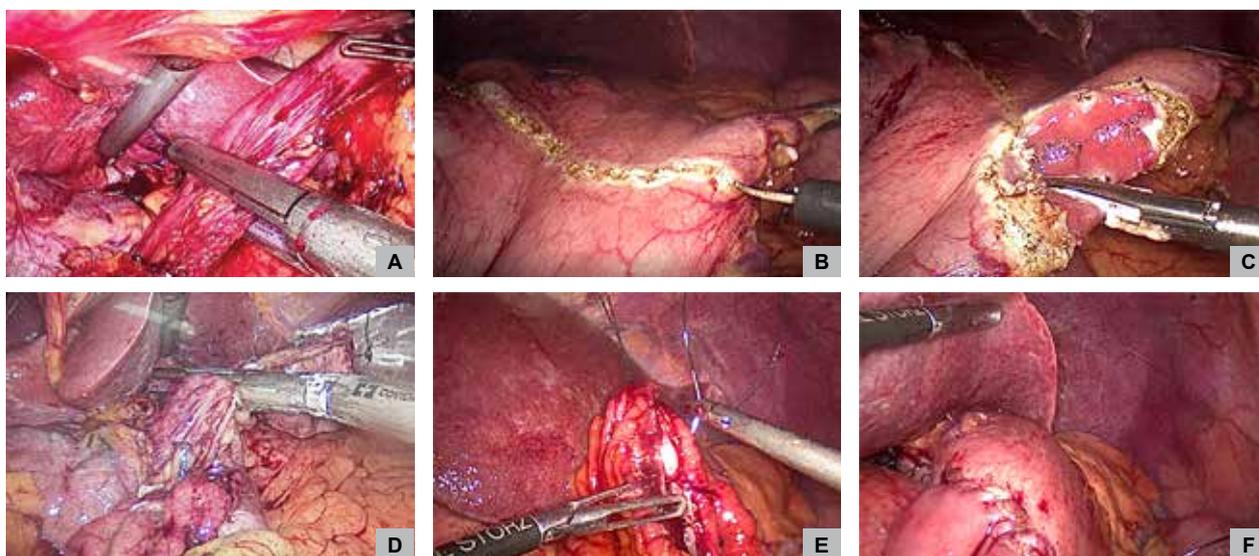


Fig.1. Steps of TLDG performed with intracorporeally anastomosis. A. Close the duodenal apex by stapler; B. Mark the resection surface on stomach; C. Dissect partially stomach using ligasure; D. Dissect the remaining area of stomach using Stapler; E. Close the posterior surface of gastric anastomosis; F. Close the anterior surface of gastric anastomosis

Postoperative follow-up: The patient had a nasal tube removed on the first day after surgery, was monitored bowel function, postoperative complications (infection of trocar sites, postoperative bleeding, anastomotic leak), and hospitalization period.

Results

Clinical, subclinical characteristics

Clinical

- Five patients had clinical symptoms and sought the medical examination, 83.3% had epigastric pain, one patient was detected incidentally through

periodic health check (gastroenterology with biopsy). Specifically: five patients, two patients (33.3%) with symptoms of weight loss. One patient (16.7%) had a history of gastritis. None of the patients had a history of smoking or alcohol use. Based on BMI, five patients (83.3%) were in average condition, one patient (16.6%) was overweight.

Subclinical

- Hematology examination: 100% of patients had normal values before surgery. After surgery, there were: two patients (33.3%) with mild anemia,

the average decrease in Hb after surgery was 17.6 ± 12 g/L. two patients (33.3%) with leukocytosis and high neutrophil count.

- Biochemistry test: 100% of patients had normal blood chemistry values before surgery. After surgery, there were five patients (83.3%) with a slight elevations of the transaminases, 100% of patients with hypoalbuminemia, however, there was no patient requiring albumin administration after surgery, the average albumin amount after surgery was 32 ± 2 g/L.

- Abdominal ultrasound, lung X-ray: 100% normal.

- CT scan: four patients (66.7%) were detected tumors 1-3cm in size, two patients (33.3%) were not detected tumors. There were no cases of liver and lung metastases detected.

- Endoscopy + biopsy: 100% of patients were diagnosed by endoscopy & biopsy as adenocarcinoma, ulcer size from 1-2 cm.

Characteristics related to surgery

Average surgical time 220.7 ± 45.3 minutes (180-266). 100% of patients were placed 5 trocars (3 trocar 10mm, 2 trocar 5mm). After completing the surgery, five patients (83.3%) were taken through the incision around the umbilicus (3cm), one case (16.7%) through supra pubic incision about 3 cm .

All patients underwent gastrojejunostomy with Finsterer type above the transverse colon was sutured with Velox suture. Five patients (83.3%) had lymph node dissection group 1-6,7,8a,p,9,11,12abp, 01 patient (16.7%) had lymph node dissection group 1-6,7,8a, p,9,11 (in this case is cancer in situ).

Postoperative histopathologic examination: one patient pTisN0, one patient pT1aN0, two patient pT1bN0, one patient pT2N0, one patient pT3N1 (2/22 lymph nodes have cancer metastasis). The average number of harvesting lymph nodes was 18.3 ± 7 (11-25).

Postoperative follow-up

The time of passage flatus was 2.5 ± 1.5 days (1-3 days). The duration of oral feeding was 4 ± 2 days (2-5 days). Time to start walking was 2.7 ± 0.7 days (2-3 days). The average hospital stay was 10 ± 3 days (8-13 days), the average hospital

stay after surgery was 7.3 ± 0.7 days (7-8 days). Postoperative complications: one patient had mild fever after surgery, one patient had fever with mild inflammation around the drained site.

Discussions

TLDG was first reported in 1992 by Dr. Goh, treating two patients with gastric ulcer [4]. In 1996, Dr. Ballesta Lopez first applied this technique for gastric cancer and proved it feasible and effective [5]. Over the past 20 years, the Billroth I, Billroth II, and Roux-en Y reconstruction techniques can all be performed laparoscopically and still attract surgeons when they become the application method in the treatment of radical gastrectomy [6].

TLDG has some advantages when compared with classical laparoscopy. In classic laparoscopy, a small opening must be created below the sternal region 5-7cm to perform the cut and make an anastomosis. Performing gastro-intestinal anastomosis in this case is difficult due to the narrow and limited surgical field, especially in obese patients with thick abdominal walls or when the remaining gastric apex is short, where the laparotomy may take longer. The surgeon must pull the gastric apex out of the body to perform the anastomosis, which can easily injure the cutting apex and may damage the spleen, causing bleeding. Moreover, with high gastric tumors, classical laparoscopy can injury the short gastric branch when pulling the stomach, causing bleeding. Chen et al. [7] evaluated the results of TLDG on 139 patients, showing that the intracorporeal anastomosis helps to reduce apical injury and maintain perfusion. On the other hand, this technique ensures the principle of not touching the tumor during surgery because when the stomach is released, the surgeon always operates outside the tumor for ligation and lymph node dissection.

There are 3 types of reconstructions following distal gastrectomy: Billroth I, Billroth II and Roux-En Y. Besides the disadvantages of stomatitis due to bile, Billroth II has many advantages over Billroth I in that it can prevent high tension anastomosis without

moving the duodenum, thus, efficiently performing in patients requiring advanced gastrectomy. Roux-En Y anastomosis has the advantage of helping to prevent bile reflux, but it is expensive (about 5-6 staplers) to perform the surgery. There are many

types of Billroth II intracorporeal anastomosis with laparoscopic that have been performed in the world, such as lateral fusion on the posterior side or at the great curvature by stapler, and lateral connection by hand connection [7], [8].



Fig. 2. Gastroduodenostomy techniques. A, B: Gastroduodenostomy using Stapler; C: using hand-sewn

Performing laparoscopic manual suturing of the anastomosis minimizes the number of cartridge using but is considered to be the most challenging technique [8]. The ability to present the two gastro-intestinal margins, careful suturing each stitch prolongs the surgical time are difficulties when performing this technique. Velox thread or herringbone thread of Covidien plays an essential role in performing the intracorporeal anastomosis. The ability to hold the thread after each stitch is very important, to avoid the anastomosis loosening during hand stitching, especially with the single-layer over-stitch technique. All gastrointestinal anastomosis in our study performed a single layer suture of the anterior transverse colon using Velox 3/0 suture. The anastomosis is about 10cm from Treitz's angle to avoid postoperative complications such as loop syndrome or some other complications such as internal hernia. The time to perform intracorporeal hand- hand-sewn anastomosis was 220.7 ± 45.3 minutes (180- 266), which is not different from report of Chen et al in 2016, the mean time of hand-sewn anastomosis was 221.4 ± 26.8 (180–280) minutes [9]. As for Jin's study (2016) [8] with intracorporeal automatic suturing anastomosis, the average operation time was 180 minutes, but it took 3 staplers and Velox sutures to close the place where

the cutter was placed to make the anastomosis.

Gastrectomy with lymph node dissection is still the radical treatment for gastric cancer, although adjuvant chemotherapy improves survival time for patients. In our study, although with six patients, the average lymph node removal rate in groups 7, 8a, 9, 11p, 12a, 12P were the same as open surgery, although performing the procedure using laparoscopic technique requires experienced surgeons [10] [11], and harvesting the lymph nodes follows the W principle: the origin of the gastro-epiploic artery, along the common hepatic artery on the right and the splenic artery on the left. The average number of harvesting lymph nodes is 18.3 ± 7 (11-25), meeting the requirements in terms of the number of harvesting lymph nodes.

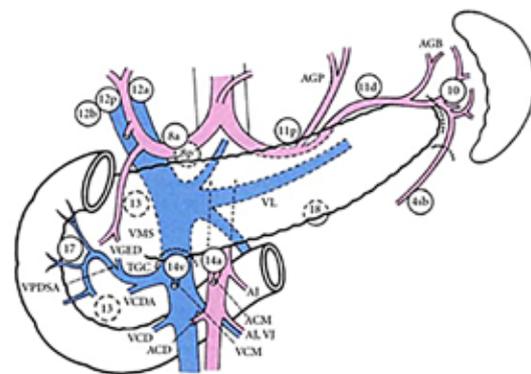


Fig. 3. D2 lymph nodes dissection in distal gastrectomy [12]

Mean time of passage flatus, time of oral feeding and length of hospital stay were 2.5 ± 1.5 days, 4 ± 2 days and 7.3 ± 0.7 days, respectively. The study of Chen (2013) [7] were 3.6 ± 1.1 days, 4.8 ± 1.6 days, and 9.8 ± 4.0 days, respectively. Time to start walking was 2.7 ± 0.7 days (2-3 days). Our study group had no early postoperative complications (bleeding, anastomotic leak, early bowel obstruction after surgery, pancreatic fistula). Nevertheless, there was one patient with mild fever after surgery, one patient with fever and mild inflammation around the drained site. On the other hand, one patient after discharge from the hospital had symptoms of abdominal bloating and gastric stasis, endoscopy check with food residue associated stomatitis, was treated medically. Chen's NC [9] showed a higher complication rate in the hand-sewn anastomosis group than in the automatic suturing anastomosis group.

Postoperative histopathology examination: one patient pTisN0, one patient pT1aN0, two patient pT1bN0, one patient pT2N0, one patient pT3N1 (2/22 lymph nodes with cancer metastasis). Therefore, 5/6 patients with gastric cancer at early stage, one patient had T3, but small in size so it was still convenient to perform using laparoscopy. According to Chens study [7], three years of survival time without recurrent and the overall survival time were 82,3% and 82,9%.

Conclusions

Laparoscopic distal gastrectomy with D2 lymph nodes dissection with intracorporeally hand – sewn Billroth II anastomosis is safe and feasible, allowing patients to faster recovery and aesthetically and economically high efficiency. Yet, we still need to monitor the patient group further to evaluate the efficiency of this technique in oncology.

Conflict of interest: The authors declare that they have no conflict of interest.

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